Aditya Saraf

as2777@cornell.edu | (425) 697 – 0256

https://adityasaraf.github.io/

RESEARCH INTERESTS

Economics and Computer Science, Behavioral Economics, Blockchains, Mechanism Design for Social Good, Networks

EDUCATION

CORNELL UNIVERSITY, Ithaca, NY   August 2021–current
Doctor of Philosophy in Computer Science (expected)

UNIVERSITY OF WASHINGTON, Seattle, WA   June 2020
Master of Science in Computer Science, GPA: 3.98

UNIVERSITY OF WASHINGTON, Seattle, WA   June 2019
Bachelor of Science in Computer Engineering, Magna cum laude, GPA: 3.86

- Minor: Philosophy
- Phi Beta Kappa (ΦBK) member

PAPERS

Published/Forthcoming:

1. Conor Mayo-Wilson, Aditya Saraf. *Collectivist Foundations for Bayesian Statistics*. Forthcoming in *Philosophers' Imprint*.

2. Darshan Chakrabarti, Jie Gao, Aditya Saraf, Grant Schoenebeck, Fang-Yi Yu. *Optimal Local Bayesian Differential Privacy over Markov Chains*. AAMAS'22.

3. Aditya Saraf**,** Anna Karlin, Jamie Morgenstern. *Competition Alleviates Present Bias in Task Completion*. WINE 2020.

4. Emily McReynolds, Sarah Hubbard, Timothy Lau, Aditya Saraf, Maya Cakmak, and Franziska Roesner. 2017. *Toys that Listen: A Study of Parents, Children, and Internet-Connected Toys*. CHI '17

In submission/preprints:

5. Joe Halpern, Aditya Saraf. *Chunking Tasks for Present-Biased Agents*. Preprint.

6. Conor Mayo-Wilson, Aditya Saraf. *Scientific Evidence and the Duty to Disclose*. In submission at *Philosophy of Science*.

7. Conor Mayo-Wilson, Aditya Saraf. *Robust Bayesianism and Likelihoodism*. Early draft presented at FEW 2019. In submission at *Statistical Science.*

Drafts of these papers (and more) can be found on my website: https://adityasaraf.github.io/

RESEARCH PROJECTS

TRANSACTION FEE MECHANISMS FOR CRYPTOCURRENCIES   July 2022–current
With Rafael Pass and Joe Halpern (Cornell)

- Formalized the transaction fee mechanisms wherein users bid on having their transactions included by miners. These mechanisms are common to a variety of cryptocurrencies.
- Analyzed these mechanisms in terms of individual user and miner incentives, as well as overall *social welfare* among transacting users

TIME-INCONSISTENCY IN PLANNING PROBLEMS   December 2019–November 2020; October 2021–current
With Anna Karlin and Jamie Morgenstern (UW); With Joe Halpern (Cornell)

- Analyzed a model of present bias (e.g., procrastination) in graph-based planning problems introduced by Jon Kleinberg and Sigal Oren. Existing work shows that present bias can result in exponentially higher cost compared to optimal behavior
- Thrust 1: Competition between multiple biased agents
  - Showed that competition alleviates some of the harms of present bias, and can naturally guide agents towards optimal behavior
  - Canonical applications include businesses competing to get to market first, incentivizing students to complete assignments, incentivizing customers to join and use gym facilities, etc.
- Thrust 2: Chunking tasks for biased agents
  - Showed how to optimally chunk a task for different types of agents simultaneously; a relatively small number of chunks suffices to guarantee optimal behavior
  - Canonical applications include chunking assignments for students and algorithmically chunking to-do list

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QUALITATIVE PROBABILITY FOR STATISTICAL PRINCIPLES   January 2019–current

With Conor Mayo-Wilson (UW)

- Worked within a formal system of qualitative conditional probability to prove statistical principles
- Showed that Bayesian foundations (of algorithms, decision theory, etc.) apply even when agents might lack quantitative degrees of belief
- Introduced a new theory of evidence based on widespread agreement that generalizes existing theories of evidence to broader settings
- Connected ethical definitions of evidence to the common statistical definitions, show how existing statistical theories can determine when one ought to disclose evidence

BAYESIAN DIFFERENTIAL PRIVACY FOR CORRELATED DATA   October 2019–June 2020

With Grant Schoenebeck (UMich), Fang-Yi Yu (UMich), and Jie Gao (Rutgers)

- Worked with a recent generalization of differential privacy called Bayesian differential privacy, which protects against a wider class of adversaries than standard differential privacy
- Analyzed highly correlated data sets, where traditional differential privacy falls short
- Created sanitized datasets for offline analysis, to enable "local" privacy that works even in distributed settings.
- Proved the near optimality of our mechanism.

TECH POLICY LAB   September 2016–June 2017

With Emily McReynolds (UW)

- Researched privacy and security concerns around upcoming technologies in the fields of autonomous vehicles, the Internet of Things, and cell-site simulators
- Co-authored "Toys that Listen: A Study of Parents, Children, and Internet-Connected Toys", published in CHI'17

FUNDED RESEARCH POSITIONS

RESEARCH ASSISTANT, University of Michigan   October 2020–present

Funded by Grant Schoenebeck to work on Bayesian Differential Privacy for Correlated Data (see above)

RESEARCH SCIENTIST, University of Washington   June 2020–September 2020

Funded by Anna Karlin to work on Time-Inconsistency In Planning Problems (see above)

TEACHING EXPERIENCE

FOUNDATIONS OF COMPUTING I, UW (CSE 311), Instructors: Kevin Zatloukal, Emina Torlak   Fall '18

   The first class in the major, teaching the basics of logic, discrete math, and formal languages.

INTRODUCTION TO ALGORITHMS, UW (CSE 421), Instructors: Various; Cornell (CS 4820), Instructor: Anke Van Zuylen

                                                                Spring '18, Winter '19, Spring '19, Fall '22

   An upper division algorithms class taught primarily to juniors/seniors.

CRYPTOGRAPHY, UW (CSE 490C), Instructor: Huijia (Rachel) Lin; Cornell (CS 4830), Instructor: Noah Stephens-Davidowitz

                                                                                    Fall '19, Spring '22

   An upper division class on formal cryptography.

INCENTIVES IN COMPUTER SCIENCE, UW (CSE 590/490Z), Instructor: Anna Karlin   Winter '20, Spring '20

   A class for master's students and advanced undergraduates that surveys topics between economics and computation.

INDUSTRY EXPERIENCE

DONUTS INC., Seattle, WA   June 2020–August 2021

Software Engineer

- Worked on a registry system that handles over 200 Top Level Domains (TLDs)
- Built a TLD import service, which is the technology that allows Donuts to acquire and merge TLDs from competing registrars

AMAZON, Seattle, WA   June 2017–September 2017

Exports and Expansion Technology – Customer Experience

Software Development Engineer Intern

- Created a full stack application with Spring MVC (Java), including a web-based frontend server and a RESTful backend service.

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- Had end-to-end ownership – discovered (internal) customer requirements; planned and designed the application; developed, tested and deployed the application to production.
- Reduced deployment cycle from 2-4 weeks to instant changes to production.